Experimental and Calculational Assessment of Hydrocarbon Dew Point Prediction Methods

D.L. George [C, S] and A.M. Barajas
Southwest Research Institute, San Antonio, TX, U.S.A.

In the natural gas industry, gas analyses provide information that is used to calculate properties such as gas density and heating value. The calculated properties are then used to determine the economic value of the natural gas. Unrepresentative or distorted gas samples will lead to errors in the calculated gas properties and in the gas' economic value. Previous research has shown that natural gas sampling equipment at temperatures below the hydrocarbon dew point temperature can cause heavy hydrocarbons to condense from the sample stream on contact, creating a non-representative sample and an inaccurate analysis of the gas stream. Accurate prediction or measurement of hydrocarbon dew point temperatures is crucial to proper natural gas sampling methods, and to the design of natural gas sampling systems capable of extracting representative samples from the pipeline.

Recent research conducted at Southwest Research Institute (SwRI), and funded by the Gas Technology Institute, the American Petroleum Institute, and the United States Minerals Management Service, has sought to define the most accurate analytical method for predicting and determining the hydrocarbon dew point temperature of natural gas. SwRI is conducting an experimental test program, using an advanced chilled-mirror measurement technique, to experimentally acquire dew point data. Previously existing dew point data and the experimental data from the SwRI test program are being used to evaluate the accuracy of the Peng-Robinson and Soave-Redlich-Kwong equations of state, as well as several methods of characterizing heavy hydrocarbons from limited chromatographic analysis data. This paper will present the results of the experimental program and the evaluations of the calculation methods. Ways in which this research will benefit standards documents for the natural gas industry will also be discussed.